



CLIMATE CHANGE & NEW YORK'S FUTURE

What the latest studies tell us about how global warming is transforming our climate

By Kristin Marcell and Art DeGaetano

Is climate change real?

Yes, say more than 3,700 scientific experts from 130 countries who make up the Intergovernmental Panel on Climate Change (IPCC). A recent IPCC report, concluded that the earth has warmed during the last century, that warming is changing the planet's climate, and that much of the warming comes from burning fossil fuels (coal, oil, natural gas) to generate electricity and to power vehicles and buildings.

Yes, say scientists in the Northeast Climate Impacts Assessment and the U.S. Global Change Research Program, both of which focus on climate change in the northeastern United States. They conclude that we can head off the worst effects of climate change in our area by improving the way we produce and use energy.

Why is the earth getting warmer?

Greenhouse gases that naturally occur in the earth's atmosphere act like a pane of glass. Energy coming in from the sun passes through the atmosphere and warms the earth's surface. But when heat radiates back out from the earth, these same gases prevent it from escaping.

The heat retained by greenhouse gases warms the

lower atmosphere—if earth's atmosphere had no greenhouse gases, its temperature would be 60°F colder—and the more greenhouse gas in the atmosphere, the warmer the temperature. Measurements show that over the last century the concentration of greenhouse gases (carbon dioxide, or CO₂, is the most common example) in the atmosphere has increased by almost 40 percent; during the same time, the average temperature of the earth has increased by more than 1°F.



Today, New York's fresh waters support thriving populations of coldwater fish like trout and salmon. Warming waters may tilt the balance toward warmwater species, diminishing the state's biodiversity.

New York State Conservationist, August 2007

Is this warming changing New York's climate?

Yes. Scientists have documented changes in the climate of the Northeastern United States that correlate with changes in temperature across the globe. The average annual temperature in the Northeast has risen 1.8° F over the last 100 years. Winter temperatures have risen even faster, as much as 4.4° in the last 30 years.

What might the future hold?

Rising temperatures. In the coming decades, summer days also are expected to become hotter, increasing evaporation of soil moisture and leading to drier conditions between rain events.

More heavy rains and stronger storms. While average annual precipitation is expected to increase only slightly, precipitation will occur more often as events heavy enough to cause local flooding. Paradoxically, the studies also suggest that short-term droughts (1 to 3 months) will be more frequent, as dry spells between heavy rains grow longer and hotter.

The energy released when water vapor in the atmosphere condenses fuels hurricanes and tropical storms. When water is warmer, it evaporates faster from the ocean surface, making more water vapor available to energize storms. The number of strong storms in the Northeast has shown relatively little change, but warmer water temperatures are expected to feed stronger storms in the coming decades.

Shorter winters and longer growing seasons. Data from the last 30 years indicate that much of the Northeast has already seen a change in the winter snow season. In the Adirondacks, total annual snowfall has decreased by 40 to 60 inches (more winter precipitation now falls as rain). During the same time, the period with snow on the ground has decreased by as much as 20 days in some parts of the state. By the end of the century, parts of New York could see only 5 to 10 days of snow cover each winter month.

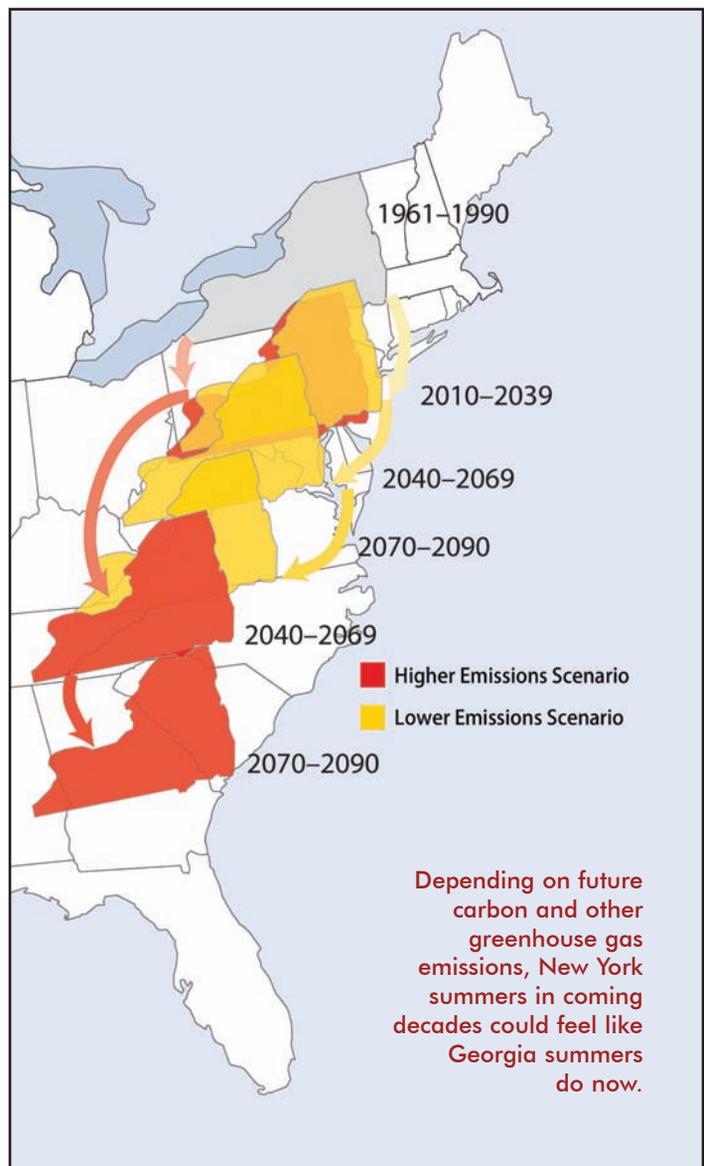
Winter freeze and thaw dates have changed as well. Lake Champlain now freezes over, on average, 11 days later than it did when records began in the early 1800s. It also thaws earlier in the spring, and in 16 of the last 31 years it hasn't frozen over at all.

In the Great Lakes region, later ice-in dates appear to be increasing "lake effect" storms, very heavy snowfalls that occur when water evaporates from unfrozen lakes that are warmer than the surrounding land surface. If the lakes freeze over later in winter (or not at all), more lake effect events are expected.

Plants bloom in response to temperature, sunshine, rainfall and humidity, all factors that determine climate. Spring bloom dates in the Northeast are now, on average, four to eight days earlier than in the 1960s. Across New York, the last frost is now eight days earlier than in the 1970s. By the end of the century, New York's growing season is projected to be four to six weeks longer.

Shorter, warmer winters and longer growing seasons will affect the types of species that survive in our region, both on the ground and in the water.

In particular, New York's fisheries could undergo significant change. Today, our marine waters are home to a seasonal mix of cold and warm/temperate species, and our fresh waters support thriving populations of coldwater fish like trout and salmon. In both fisheries, warming waters may tilt the balance toward warmwater species, diminishing the state's biodiversity.



It also may become too warm for traditional New York plants, such as sugar maple trees. The maple syrup season decreased by two to four days in the last 30 years; at some point in the future, maple syrup production may no longer be viable in our region.

Higher sea level. Measured at tidal gauges in New York Harbor, sea level today is more than 15 inches higher than it was 150 years ago. Some of this change is due to geological forces. The remainder comes from the expansion of ocean water as it warms, and from the melting of glaciers and polar ice sheets.

With so many forces at work, it is difficult to predict future sea level rise. Instead, scientists offer a range of possible levels, depending in part on whether CO₂ emissions are stabilized or continue to increase. By mid-century, a conservative projection puts global sea level between 2.5 and 13 inches higher than today. By the end of the century, scientists estimate a rise of between 4 and 33 inches, or even higher if glaciers and ice sheets melt more rapidly than projected.

Scientists predict that this higher sea level could double the likelihood of a storm that produces a 100-year flood in New York City. Rising sea waters may also increase saltwater intrusion into drinking water supplies near the coast, and could inundate tidal marshes and sensitive shallow habitats that support many species of fish and wildlife. While these critical aquatic habitats naturally migrate inland with rising water, attempts to buttress shorelines against rising seas will prevent lost habitat from replacing itself.



Yearly snowfall in the Adirondacks has decreased by 40 to 60 inches. By the end of the century, parts of New York could see only 5 to 10 days of snow each month during the winter.

What are New Yorkers doing to confront climate change?

The amount of climate change we see will depend on energy choices we make today and over the next decade. While New York alone cannot determine the climate future, our actions can demonstrate practical ways to limit emissions of greenhouse gases, and show that changes in energy use and production can help the economy.

Governor Eliot Spitzer recently announced a comprehensive plan for reducing energy costs and curbing pollution. The goal of the governor's plan is a 15 percent reduction in electricity use by 2015, making New York the only state to commit to lowering electricity consumption below current levels. The plan will create new, improved appliance efficiency standards and energy building codes, invest millions in new renewable energy projects, expedite review of wind power projects, modernize existing power plants, and introduce ultra-clean fossil fuel power generation with very low carbon dioxide emissions. Gov. Spitzer also

CLIMATE CHANGE REPORTS

The best current information on our area's climate change is found in two reports:

Climate Change in the U.S. Northeast is a report of the Northeast Climate Impacts Assessment, a collaboration between the Union of Concerned Scientists and a team of independent experts. This study estimates the effects of climate change under two scenarios: high emissions (continued heavy reliance on fossil fuels, with rapid growth of greenhouse gas emissions), and low emissions (a shift away from fossil fuels, with a decline in greenhouse gas emissions by mid-century).

The report stresses that, while some additional warming is unavoidable, how much climate change we experience will depend on our energy choices.

The Potential Consequences of Climate Variability and Change - Metro East Coast is one section of a national study carried out by the U.S. Global Change Research Program. It outlines the potential effects of climate change on resources and infrastructure in northeastern New Jersey, western Connecticut, southeastern New York, and Long Island.



While average annual precipitation will probably increase only slightly, events heavy enough to cause local flooding are expected to be more frequent.

recently announced a State Task Force on Renewable Energy headed by Lt. Gov. David Paterson.

By 2013, the state's Renewable Portfolio Standard will increase the volume of electricity generated from renewable sources in New York from the current 19 percent to 25 percent. The state's Energy\$mart™ program, which already has cut energy bills by \$230 million annually and created more than 4,400 new jobs, will receive renewed emphasis.

New York is part of the groundbreaking Regional Greenhouse Gas Initiative (RGGI), a cap-and-trade program that uses the market to regulate carbon dioxide emissions from power plants. Capping emissions at 2009 levels, RGGI then aims to reduce these emissions by 10 percent in the next decade. Ten northeastern states are part of RGGI so far.

New York State has also adopted the California standards that will reduce passenger vehicle

greenhouse gas emissions by 30 percent.

Local and regional climate change initiatives are appearing across New York.

—DEC's Hudson River Estuary Program has begun to organize local officials, universities, not-for-profits, and other groups for a regional strategy to respond to climate change.

—Localities across the state are measuring greenhouse gas emissions and developing strategies to reduce them.

—Cities and counties have created climate change and sustainability task forces of business, local government and academic participants.

—Municipalities are using renewable energy to power municipal buildings, revising building codes to improve energy efficiency standards, purchasing energy efficient vehicles and educating the community on climate change.

Climate change is already occurring and New Yorkers must prepare to cope with the inevitable results. However, if we make the correct choices now to reduce CO₂ emissions, we can avoid the most severe consequences for future generations.

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STEPS YOU CAN TAKE RIGHT NOW TO REDUCE CLIMATE CHANGE

(AND SAVE YOURSELF SOME MONEY)

- ❖ Turn off lights, computers, and appliances when not in use
- ❖ Replace incandescent lightbulbs with compact fluorescents
- ❖ Walk, bike or carpool to work or on errands
- ❖ Turn down the heat or air conditioning at home and in the office
- ❖ Obey the speed limit when driving
- ❖ Keep your vehicle's tires properly inflated
- ❖ Look for the label and purchase Energy Star appliances
- ❖ Purchase a fuel-efficient car, such as a hybrid
- ❖ Buy green power: check the Public Service Commission website for more information-<http://www.energyguide.com/finder/NYFinder.asp>
- ❖ Support efforts to increase renewable energy sources like solar, wind, and geothermal